



Design Practicum

Small Wind Systems Tutorial
Village Power Conference Workshop



Assignment:

Power a School and Clinic

Questions:

- How many 1 kW wind turbines, on 19m towers, for an all-wind system?
- How many 100 W PV modules for an all-PV system?
- If wind is \$2.50/Watt and PV is \$7/W, what is the least cost system? (think hybrids!)

Loads:

- All loads are AC
- (6) 30W Florescent Lights @ 6 hrs
- (6) 12W CF Lights @ 6 hrs
- (2) Computers, 19" Monitors @ 4 hrs
- Inkjet printer @ 2 hr
- Satellite Dish @ 3 hrs
- TV, 19" @ 2 hrs
- VCR @ 1 hrs
- High Efficiency Freezer (150W) @ 8 hrs



Assignment:

Power a School and Clinic

Wind and Solar Resources

Month	Average Wind Speed (m/s)*	Solar Resource (kWh/m ² /day)
Jan	5.2	3.3
Feb	5.4	4.1
Mar	5.8	4.2
Apr	6.1	4.6
May	5.8	5.2
Jun	5	6.1
Jul	4.8	6.2
Aug	3.9	6.2
Sep	4.4	5.6
Oct	5	5.1
Nov	4.8	4.5
Dec	5.4	3.9
Annual	5.1	4.9

[* at 10m height]

- No back-up generator, so Load Coverage's must be at least 100% in each month
- Weibull K = 2 (inland site)
- Wind Shear exponent = 0.2
- Turbulence derating is 5%
- Turbine performance safety factor is 10%
- Site altitude is 310 m
- Use pre-set BOS component efficiencies



Worksheet

- ❖ Daily AC Energy Required: _____ kWh
- ❖ 1 kW Wind Turbine Daily Energy (DC kWh): Jan _____, Feb _____, Mar _____, Apr _____, May _____, Jun _____, Jul _____, Aug, _____, Sep _____, Oct _____, Nov _____, Dec _____
- ❖ 1 kW PV Daily Energy (DC kWh): Jan _____, Feb _____, Mar _____, Apr _____, May _____, Jun _____, Jul _____, Aug, _____, Sep _____, Oct _____, Nov _____, Dec _____
- ❖ All-Wind Requires _____ 1 kW Turbines
- ❖ All-Solar Requires _____ 100 W Modules
- ❖ Least Cost System Requires _____ 1 kW Wind Turbines and _____ 100 W Solar Modules

